

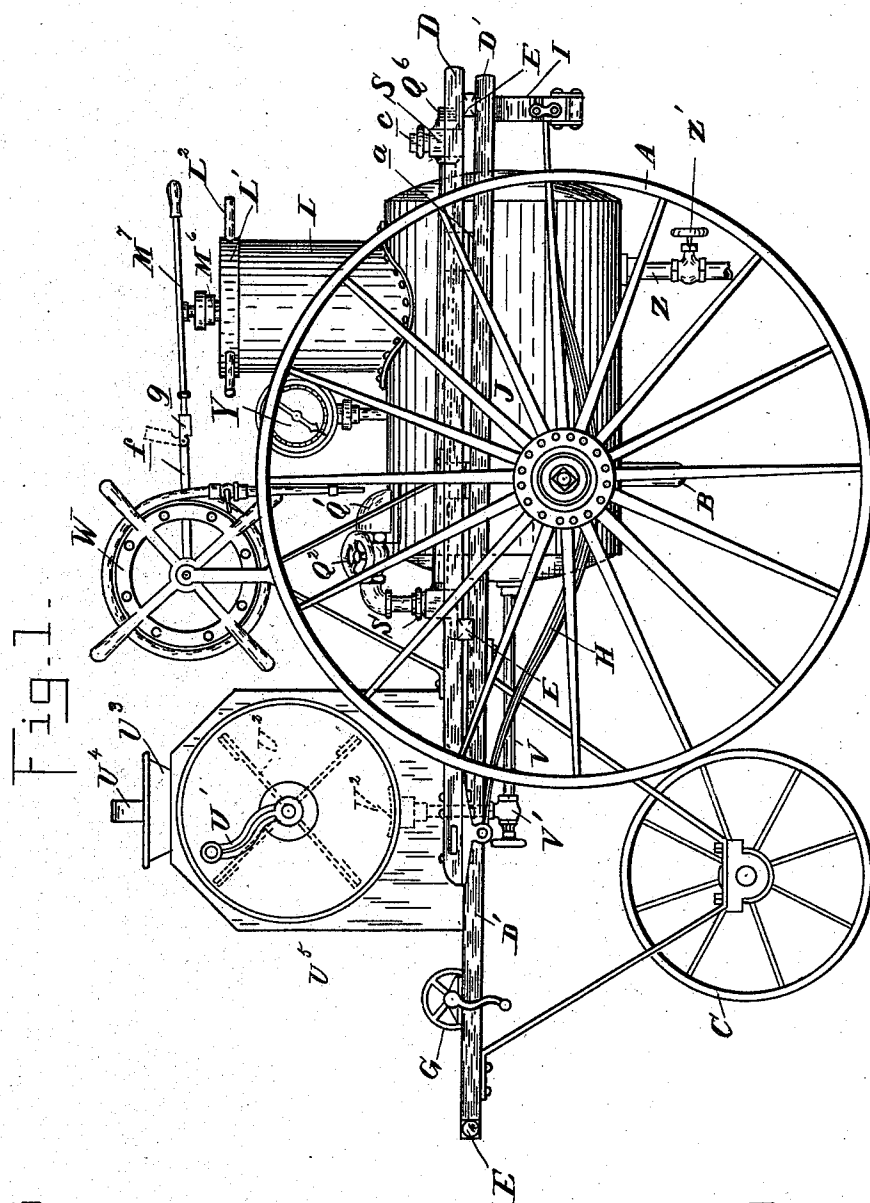
(No Model.)

3 Sheets—Sheet 1.

R. T. VAN VALKENBURG.
CHEMICAL ENGINE.

No. 413,837.

Patented Oct. 29, 1889.



Witnesses

Geo. A. Sugg.
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Inventor:

Randall T. Van Valkenburg.

By *Mrs. S. Sprague* Son

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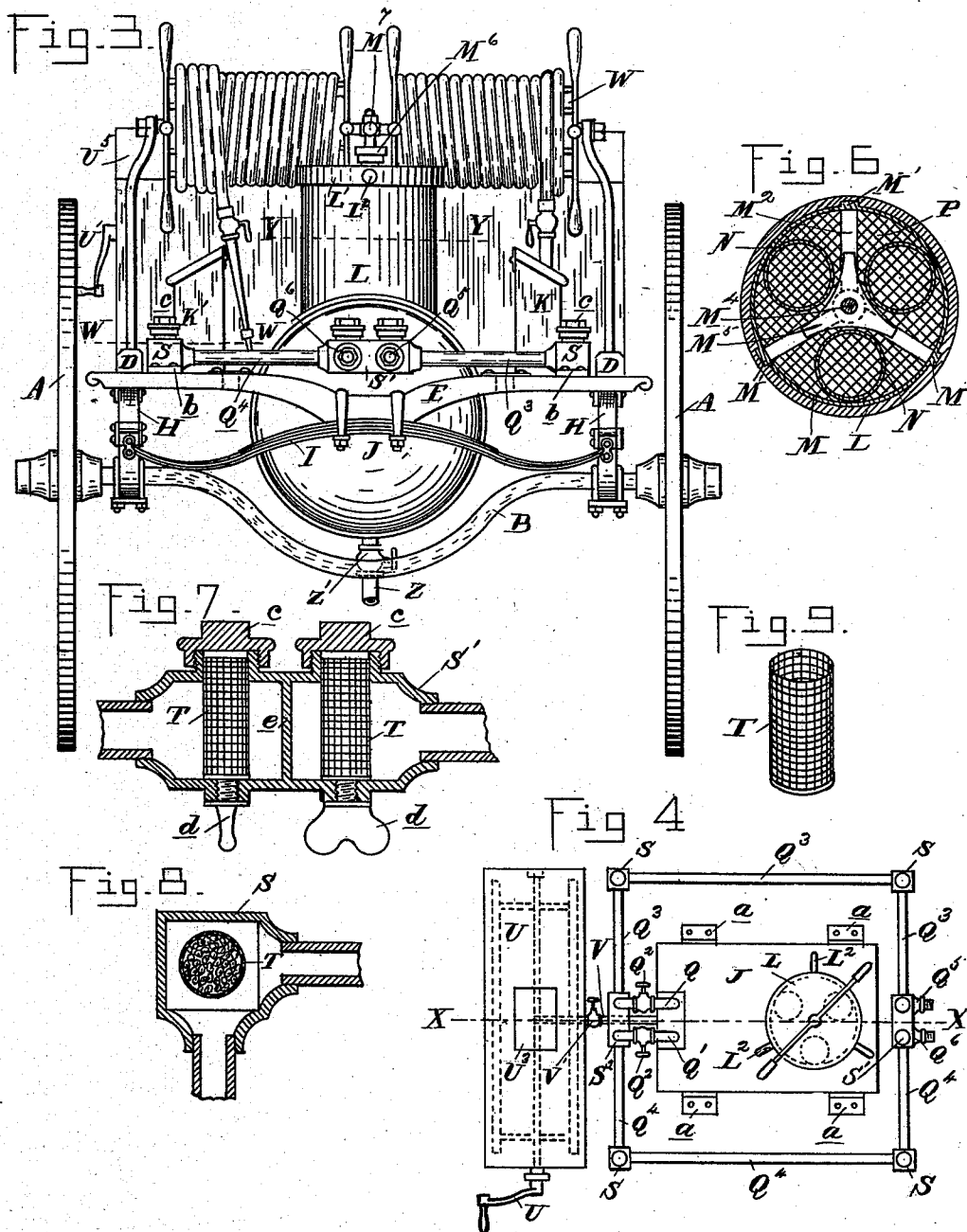
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8 Sheets—Sheet 3.

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UNITED STATES PATENT OFFICE.

RANDALL T. VAN VALKENBURG, OF MUSKEGON, MICHIGAN, ASSIGNOR TO
THE MUSKEGON CHEMICAL FIRE ENGINE COMPANY, OF SAME PLACE.

CHEMICAL-ENGINE.

SPECIFICATION forming part of Letters Patent No. 413,837, dated October 29, 1889.

Application filed June 5, 1889. Serial No. 313,221. (No model.)

To all whom it may concern:

Be it known that I, RANDALL T. VAN VALKENBURG, a citizen of the United States, residing at Muskegon, in the county of Muskegon and State of Michigan, have invented certain new and useful Improvements in Chemical-Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to new and useful improvements in chemical-engines, intended to form an improvement on Letters Patent No. 383,303, granted to me May 29, 1888; and the invention consists in the novel construction, arrangement, and combination of different parts, all as more fully hereinafter described, and specifically set forth in the claims.

In the drawings which accompany this specification and form a part thereof, Figure 15 1 is a side elevation of my improved chemical-engine. Fig. 2 is a plan thereof with the hose-reel removed to show the parts below. Fig. 3 is a rear elevation. Fig. 4 is a diagram plan of the mixer, generator, and connections thereof. Fig. 5 is a vertical longitudinal section on line X X in Figs. 2 and 4. Fig. 6 is a horizontal section on line Y Y in Fig. 3. Fig. 7 is a vertical central section on line Z Z in Fig. 2. Fig. 8 is a horizontal section on line W W in Fig. 3. Fig. 9 is a detached perspective view of one of the perforated cups shown in Figs. 7 and 8.

All the operating parts of my chemical-engine are mounted upon a light and strong frame mounted on two wheels A A on a curved axle B, and a small wheel C (see Fig. 1) in the center in front of the wheels A A serves as a front support. The frame is preferably constructed of the longitudinal bars D, rigidly connected near the front and rear by cross-bars E, with the inner longitudinal bars extended in front and provided with a suitable draft appliance, such as the handle-bar F and the rope-pulley G. The frame is supported on the axle by means of springs, such as the C-springs H under the side bars of the frame and the cross-spring I, which connects the rear ends of the side springs and supports the frame in the center of the rear cross-bar of the frame. The frame thus constructed forms an opening in the center, in which the

generator J is supported, and two openings on the sides, in which the boxes K K' are secured, and which serve to carry the materials for charging the generator.

The generator forms a closed tank and is suitably constructed to withstand a high degree of pressure, and for this purpose it is preferably made of cylindrical shape with convex heads, as shown, and is supported upon the frame by means of the lugs a, secured to the sides of the generator. Near the rear end this generator is provided with a dome L, which incloses the acid-chamber, and the dome is provided with a removable head L', detachably secured thereto, preferably by means of a screw-thread engagement, suitable hand-holds L² being formed on said head for conveniently screwing it on and off when required to charge the dome with the acid. Into this dome L is fitted a removable cylindrical vessel M, which is provided with one or more vertical ribs M', which engage into corresponding grooves on the inner face of the dome L, for the purpose of holding the vessel M in a fixed relation within the dome L and prevent it from rotating therein. On the bottom of this vessel is formed a spider M'', which may be formed integral with the ribs M', and which supports on a central step M³ the breaker-shaft M⁴. This breaker-shaft is provided at its lower end with the breaker-arms M⁵, and passes through a stuffing-box M⁶ in the head of the dome, and bears a handle M⁷ for rotating it in its bearings. To the walls of the inner vessel are secured the open-ended pockets N, adapted to securely hold the acid-containing bottles O. The bottom of the vessel M is perforated or provided with the screen P.

To the top of the generator are connected two discharge-pipes Q and Q', which are controlled by the valves Q'' and extend downwardly in front of the generator. They connect into the horizontal system of discharge-pipes Q³ and Q⁴, which form two distinct outer circuits around the ends and sides of the generator and terminate at the rear end near the center in the coupling members Q⁵ and Q⁶, to which the fire-hose is adapted to be secured. I preferably connect the two systems of discharge-pipes into one single structure, which

forms a four-sided pipe-frame, supported by brackets *b* on the four corners upon the cross or the side bars of the supporting-frame. At different places in these discharge-pipes, preferably at the corners, and in the center where the two systems are united, I place enlarged couplings *S*, *S'*, and *S*². The couplings *S* at the four corners of the frame are preferably cast integral with the brackets *b* and are provided with an opening on top, which is closed by a screw-cap *c*, and in this opening is removably secured a cup *T*, made of perforated metal or wire screen. In the bottom of this coupling is an opening or drip, which is closed by a suitable drip-plug *d*. The couplings *S'* *S*² are similarly constructed to the couplings *S*, but are made twice as long and divided in the center by a partition *e*, so as to form a separate chamber for each system of discharge-pipes, and the coupling *S'* is provided in the same manner as described for the couplings *S* with the screw-cap and perforated cup, and the drip at the bottom of the chamber with the screw-plug. The coupling members *Q*⁵ and *Q*⁶ are connected to or formed integral with the coupling *S'*, as shown. The coupling *S*² is similarly constructed with the coupling *S'*, except that the openings on top of the coupling are connected to the discharge-pipes *Q* and *Q'*, respectively.

Upon the forward part of the frame is supported the mixing tub or cylinder *U*. This contains an axial shaft journaled in suitable bearings in the head of the cylinder, and is provided upon one end with the crank *U'* and within the cylinder with the stirrings-wings *U''*. The top of the cylinder is provided with the opening or hopper *U*³, which is closed by a suitable cover *U*⁴. From the bottom of the cylinder a discharge-pipe *V* leads into the generator, and this pipe is controlled by a valve *V'*, and its inlet-opening is covered by a screen *V''*. This mixing tub or cylinder is secured above the level of the top of the generator, so that its contents may be drained into the generator by opening the valve *V*. It is preferably inclosed in an outer frame *U*⁵, by means of which it is supported upon the forward portion of the frame.

A hose-reel *W* is suitably supported upon the frame of the machine, and upon it are preferably secured two lines of hose, and from the central support of this hose-reel an arm *f* extends rearwardly and is provided at its free end with the hinged cap *g*, which is adapted to engage with the free end of the lever *M*⁷.

A pressure-gage *Y*, Fig. 1, is attached to any suitable part of the generator, and to the under side of the generator is attached the blow-off pipe *Z*, which is controlled by the blow-off cock or valve *Z'*.

In practice, the parts being constructed and arranged as shown and described, they are intended to operate as follows: A suitable quantity of the carbonate, together with the necessary amount of water for forming a so-

lution, is introduced into the mixing-tub *U*, and by turning the crank *U'* a quick solution is effected. From there, by opening the valve *V*⁷⁰ *V'*, the contents are drained into the generator, after which the valve *V'* is closed. The bottles containing the acid having been previously secured in the pockets *N* of the acid-containing vessel, the lever *M*⁷ of the breaking device is disengaged from the locking-latch *g*. Then, by giving it a vigorous turn, the breaker-arms *M*³ at the lower end of the breaker-shaft will smash the bottles and allow the liquid to escape through the perforated bottom into the generator, all pieces of broken glass being retained in the vessel *M*. The generator having now become charged, a discharge may be effected by opening either one of the valves in the discharge-pipes *Q* and *Q'* or by opening both of the valves, as desired. Thus either one or two streams may be obtained from the engine. The discharge through the discharge-pipe *Q* follows the system of pipes *Q*³ to the outlet *Q*⁵, and the discharge through the discharge-pipe *Q'* follows the system of pipes *Q*⁴ to the outlet *Q*⁶ into the flexible hose connected thereto.

The object of the perforated cups *T* is to contain some dry carbonate for the purpose of neutralizing all the acid which may possibly be carried off from the generator unconsumed, and thereby it not alone increases the pressure, but also prevents the waste of acid and its injurious action in the discharge-passages and hose. If the material in these cups become spent, they may be readily refilled by unscrewing the cap *c*.

The special advantages of my construction consist in the economical disposition of the various parts, in the facility for controlling the generator and obtaining one or two streams, the formation of the circuitous system of discharge, whereby all the acid may be eliminated from the charge, in the peculiar construction of the system of discharge-pipes, which forms an element of strength in the construction, in the novel arrangement of the mixing-tub, whereby no time is wasted in preparing new charges, as a solution may be readily prepared while the generator is discharging, and in the peculiar arrangement for permitting the whole system to be drained and cleaned after use.

By bending the axle downwardly, as shown, the generator may be hung low, and thereby present great stability combined with light draft.

What I claim as my invention is—

1. In a chemical-engine, the combination, with the generator, of a quadrilateral system of discharge-pipes divided by central partitions and two independent discharge-pipes connecting each half thereof with the generator, substantially as described.

2. In a chemical-engine, the combination, with the generator, of a quadrilateral system of discharge-pipes divided by central partitions, perforated cups contained in enlarged

couplings or sections of said system, and two independent discharge-pipes connecting said system with the generator, substantially as described.

5 3. The combination, with the generator, of a quadrilateral system of discharge-pipes provided with the couplings S, S', and S², the dividing-partitions e in the couplings S' S², the hose-connections Q⁵ and Q⁶ on the coupling S',
10 and the two independent discharge-connections Q and Q' from the generator to the coupling S², substantially as described.

4. The combination, with the generator, of the quadrilateral system of discharge-pipes Q³ and Q⁴, the couplings S' and S² in said system, the dividing-partitions e in said couplings, the hose-connections Q⁵ and Q⁶ on the coupling S', the corner-couplings S, and the perforated cups T, removably secured in the
20 couplings S and S', substantially as described.

5. In a chemical-engine, the combination of the generator, the dome L, provided with the removable head L', the acid-containing vessel M, detachably fitting therein and provided
25 with the ribs M', engaging into grooves in the cylindrical wall of the dome, the acid-holding pocket secured to the walls of the vessel M, the breaker-shaft M⁴, provided with the breaker-arms M⁵, and the lever M⁷, substantially
30 as described.

6. In a chemical-engine, the combination of the frame, a generator supported therein, the quadrilateral system of discharge-pipes, the couplings and hose-connections for said pipes,

the dome on the generator, the perforated
35 bottom, the breaker and the pockets in said dome, the stirring-tub communicating with the generator, and the stirrer in said tub, the parts being adapted to serve substantially as
40 and for the purpose described.

7. In a chemical-engine, the combination of the frame, the generator supported therein, the quadrilateral system of pipes having the couplings and hose-connections, the stirring-
45 tub having the stirrer, the pipe leading from said tub to the generator and having a valve, the dome on the generator, the detachable acid-containing vessel in said tub having the pockets and perforated bottom, the breaker in
50 said vessel, and the catch for retaining the breaker, all arranged and adapted to operate substantially as and for the purpose described.

8. In a chemical engine, the combination of the frame, the generator supported therein, the quadrilateral system of discharge-pipes
55 divided by central partitions, two independent discharge-pipes connecting each half thereof with the generator, the couplings for the said pipes, and the hose-connections, all
60 substantially as described.

In testimony whereof I affix my signature, in presence of two witnesses, this 13th day of March, 1889.

RANDALL T. VAN VALKENBURG.

Witnesses:

J. W. BUELL,
ED. MCBREARY.